

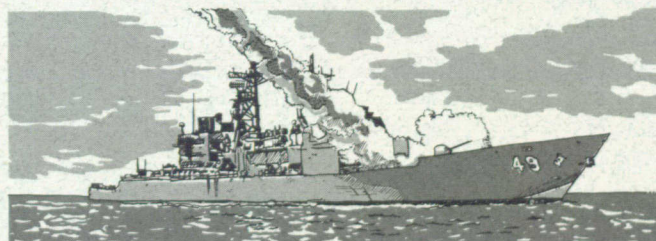
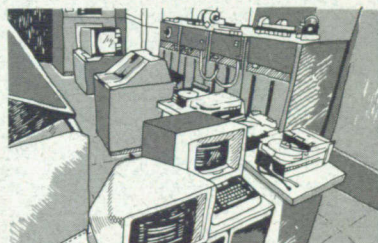
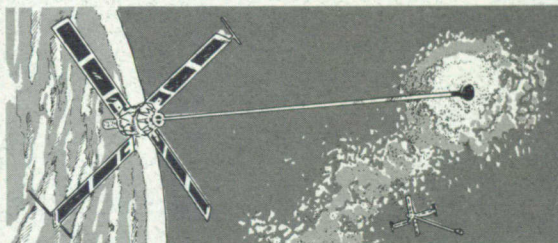
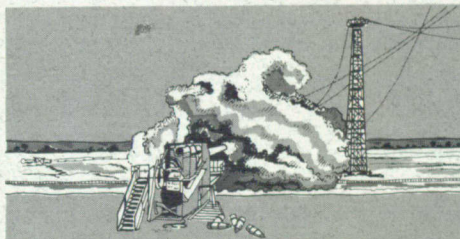


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1990 REPORT TO THE COMMUNITY

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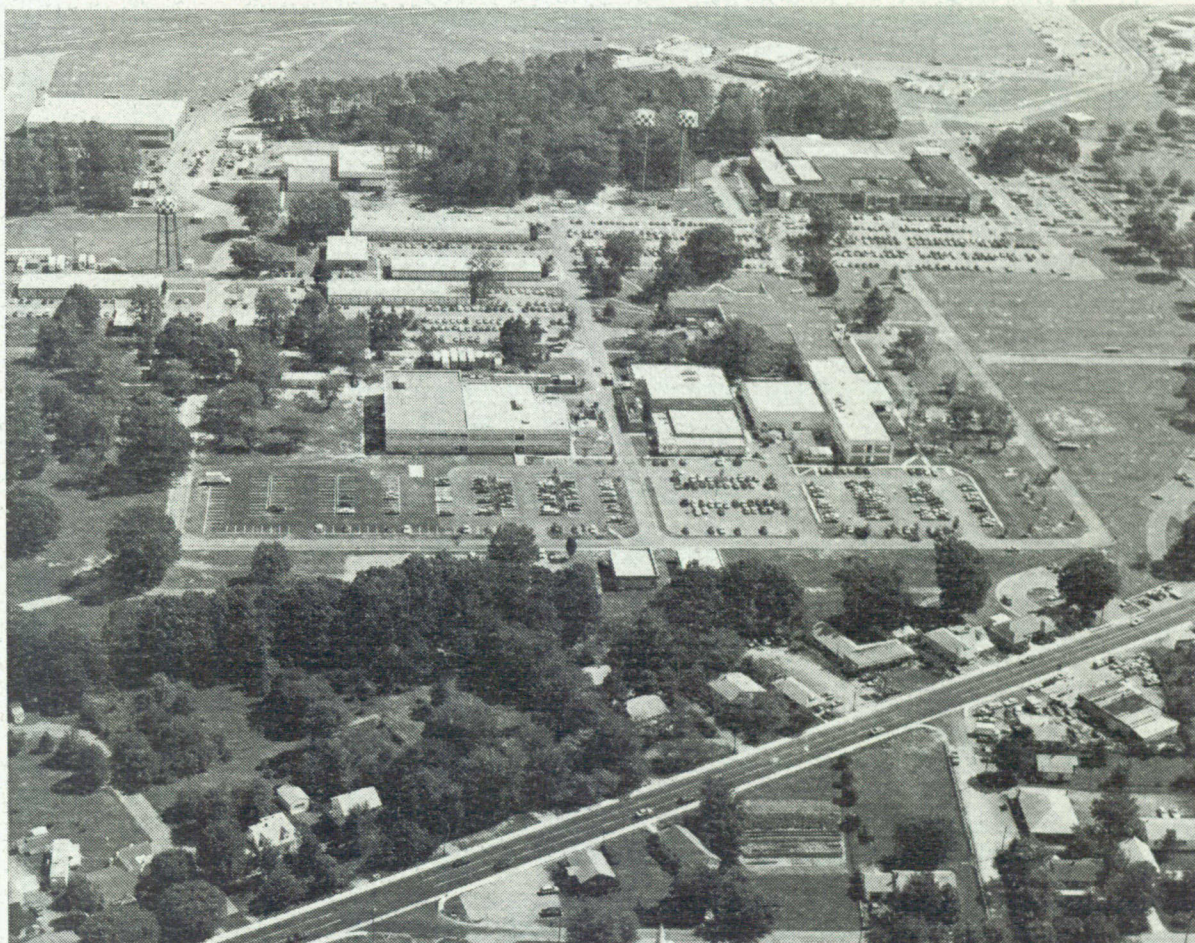


NAVAL SURFACE WARFARE CENTER
DAHLGREN, VIRGINIA

Report Documentation Page			Form Approved OMB No. 0704-0188		
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1990

Report to the Community



Aerial View of NSWC, Dahlgren

Naval Surface Warfare Center Dahlgren, VA 22448-5000

26 MARCH 1990

NSWC MP 90-105

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MISSION

To be the principal Navy RDT&E Center for surface ship combat systems, ordnance, mines, and strategic systems support.

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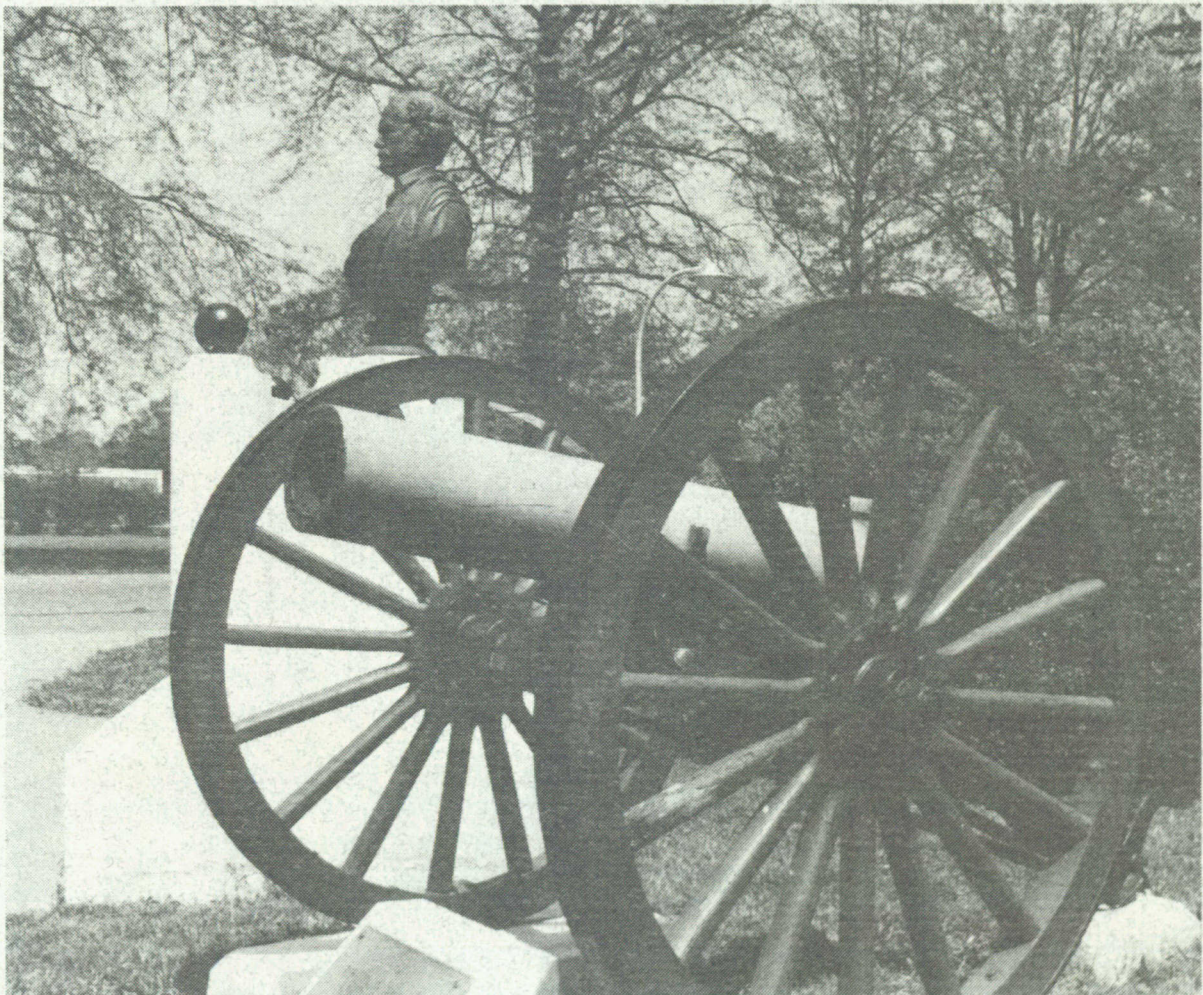
WELCOME

The Naval Surface Warfare Center (NSWC) and the King George County area have enjoyed a long and prosperous relationship. This relationship is knitted by shared interests of economics, patriotism, and national defense; and it is bound by a common desire to discover new pathways toward a brighter future, both for NSWC and its neighbor. These

hopes and dreams evolve into mutual growth for the Center and the community. NSWC has grown from a small proving ground for testing guns to the largest research and development (R&D) Center in the United States.

The hard-working, loyal, and spirited citizens of this community play the important roles in leading NSWC in its commitment to a tradition of excellence. We have a lot to be proud of, as civilians and military alike strive to maintain the technological edge.

Homage is paid to this community for the unique involvement it has with the Navy community. Thank you for joining us in our efforts toward advancing the national interests of the United States throughout the world.





CAPT ROBERT P. FUSCALDO, USN
COMMANDER
NSWC

CAPT Robert P. Fuscaldo assumed command of NSWC on 30 June 1988 following a tour as Deputy Program Manager for the AEGIS Shipbuilding Program, Naval Sea Systems Command (NAVSEA). A native of Tuckahoe, New York, he entered the U.S. Navy through the NROTC program at the University of Notre Dame, where he earned a Bachelor of Science degree in chemical engineering in 1961. He is also a graduate of the U.S. Naval Postgraduate School (ordnance engineering) in Monterey, California and the Industrial College of the Armed Services at National Defense University.

CAPT Fuscaldo's early Navy experience included tours aboard amphibious ships and destroyers where he participated in wargaming and Antisubmarine Warfare operations with Hunter-Killer Group Alpha. He also served in the Bureau of Naval Personnel Training Directorate. In 1967 and 1968, CAPT Fuscaldo

commanded a river patrol boat squadron in Vietnam that operated primarily on the rivers and canals of II and IV corps. He later served for 27 months as Damage Control Officer aboard USS KITTY HAWK (CV 63), which was deployed during much of that time to Yankee Station off the coast of Vietnam.

In 1972, he reported to the Naval Weapons Support Center (NSWC), Crane, Indiana as Director of Ordnance, responsible for weapons production. CAPT Fuscaldo then returned to sea, commanding USS KISKA (AE 35), which was the Navy's newest ammunition ship.

Following his first tour of duty at NSWC, Dahlgren as Assistant for Military Applications in the Weapons Systems Department, he served as Assistant Chief of Staff for Operations to Commander, Surface Group, Western Pacific (CTF 73 and 75) in the Philippines. There he was responsible for the operations of 77 ships and coordinated activities concerned with fleet exercises, battle readiness, logistics, and training. These operations extended from the Persian Gulf to the International Dateline and from the Sea of Okhotsk to Australia. In 1983, as Executive Assistant to Commander, Naval Sea Systems Command, he took part in getting the new DDG 51 ARLEIGH BURKE class approved.

CAPT Fuscaldo's decorations include the Bronze Star with Combat V; the Meritorious Service Medal (three awards); the Navy Commendation Medal with gold star; Combat Action Ribbon, Presidential Unit Citation; Navy Unit Citation (three awards); and various service and campaign ribbons.

CAPT Fuscaldo and his wife, the former Barbara Bond of Fond du Lac, Wisconsin, reside in Dahlgren, Virginia with their children, Jason, Elizabeth, Jared, and Robert Joseph.



DR. THOMAS A. CLARE
TECHNICAL DIRECTOR
NSWC

Dr. Thomas A. Clare was named Technical Director of NSWC on 27 February 1989. Most recently, Dr. Clare headed the Center's Engineering and Information Systems Department and chaired the Finance and Business Systems Resource Board.

A native of New York, Dr. Clare accepted a position as an aeroballistics engineer at NSWC in 1967. He held bachelor's and master's degrees in aerospace engineering from the University of Notre Dame and completed his doctorate there in 1970.

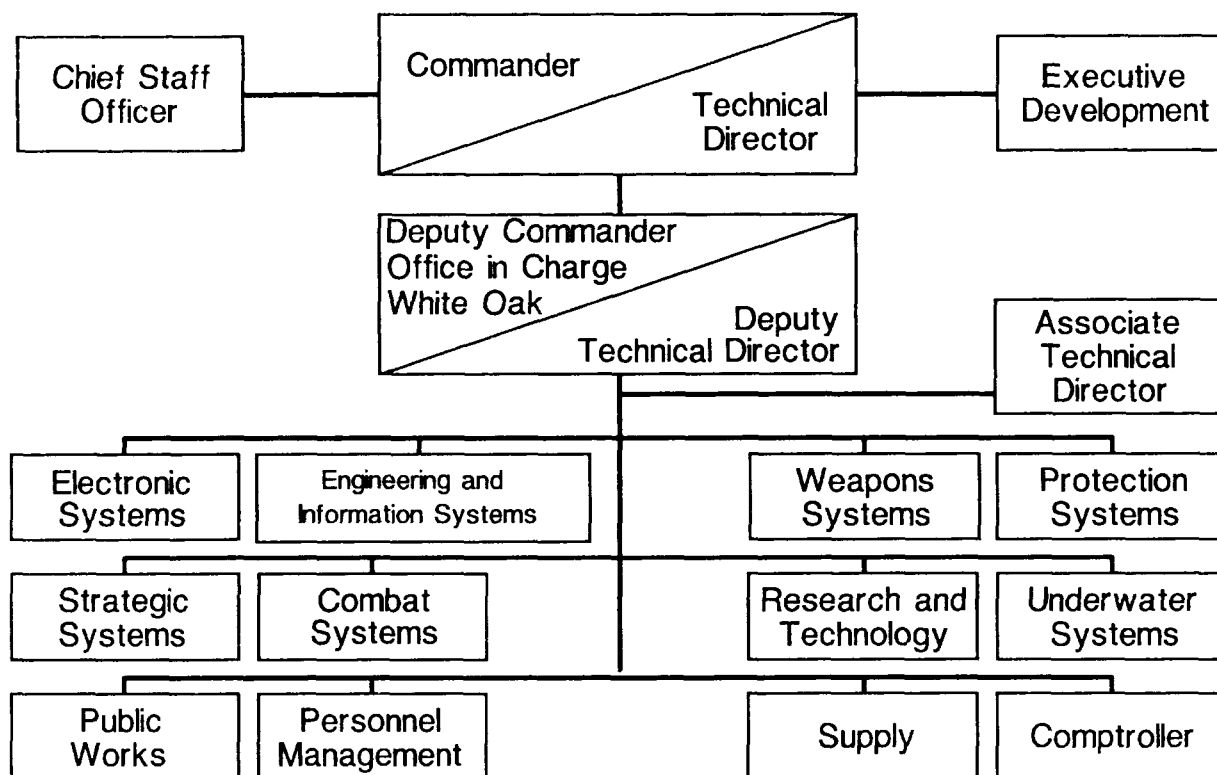
Dr. Clare was selected to head the Center's Aeromechanics Branch in 1973. Two years later, he was named Head of the Exterior Ballistics Division. From 1975 to 1976, Dr. Clare served as Science Advisor to Commander, Naval Surface Force Atlantic in Norfolk, Virginia.

Upon returning to NSWC, Dr. Clare headed the AEGIS Ship Combat Systems Division until he was named Deputy Head of the Center's Electronics Systems Department in 1979. Subsequently, he headed the Combat Systems and the Strategic Systems Departments before moving to the Engineering and Information Systems Department.

Dr. Clare received the Navy Superior Civilian Service Award in 1986 for his outstanding technical, managerial, and administrative leadership. Early in the development of the Navy's Warfare Systems Architecture and Engineering concepts, he chaired a working group at the Naval Space and Warfare Systems Command that prepared a transition plan for battle force command and control systems.

Dr. Clare resides in Fredericksburg, Virginia with his wife, Rose Mary, and son, Todd, a high school student. Son Tom is a student at the University of Notre Dame.

NSWC'S ORGANIZATIONAL CHART (MARCH 1990)



NSWC TODAY

NSWC draws on 70 years of R&D experience to help meet tough surface warfare requirements. From basic research, to fleet support, to advanced system upgrade, we devise innovative concepts to link the offensive and defensive capabilities of ships, submarines, aircraft, and other systems that make up the battle force. While vigorously supporting today's modern surface fleet, NSWC is developing the weapon systems of the 21st century.

This Center brings together resources designed to encourage creative teamwork. We exploit the great potential offered by advanced scientific and engineering concepts that were virtually unknown a few short years ago. We are dedicated to providing better weapons for our sailors at sea and to keeping our Navy ahead of the rest. At NSWC, our people support a strong Navy--whether they are working behind a desk, at a bench, in the field, or at sea.

In 1974, the Navy established the Naval Surface Weapons Center as a result of the merger of the Naval Weapons Laboratory at Dahlgren, Virginia and the Naval Ordnance Laboratory at White Oak, Maryland. With that merger came added responsibilities and a greatly expanded mission. From Dahlgren's early work on naval gun systems and White Oak's underwater mine developments, we evolved into one of the Navy's largest research, development, test, and evaluation (RDT&E) centers with a full-spectrum mission in support of the surface Navy.

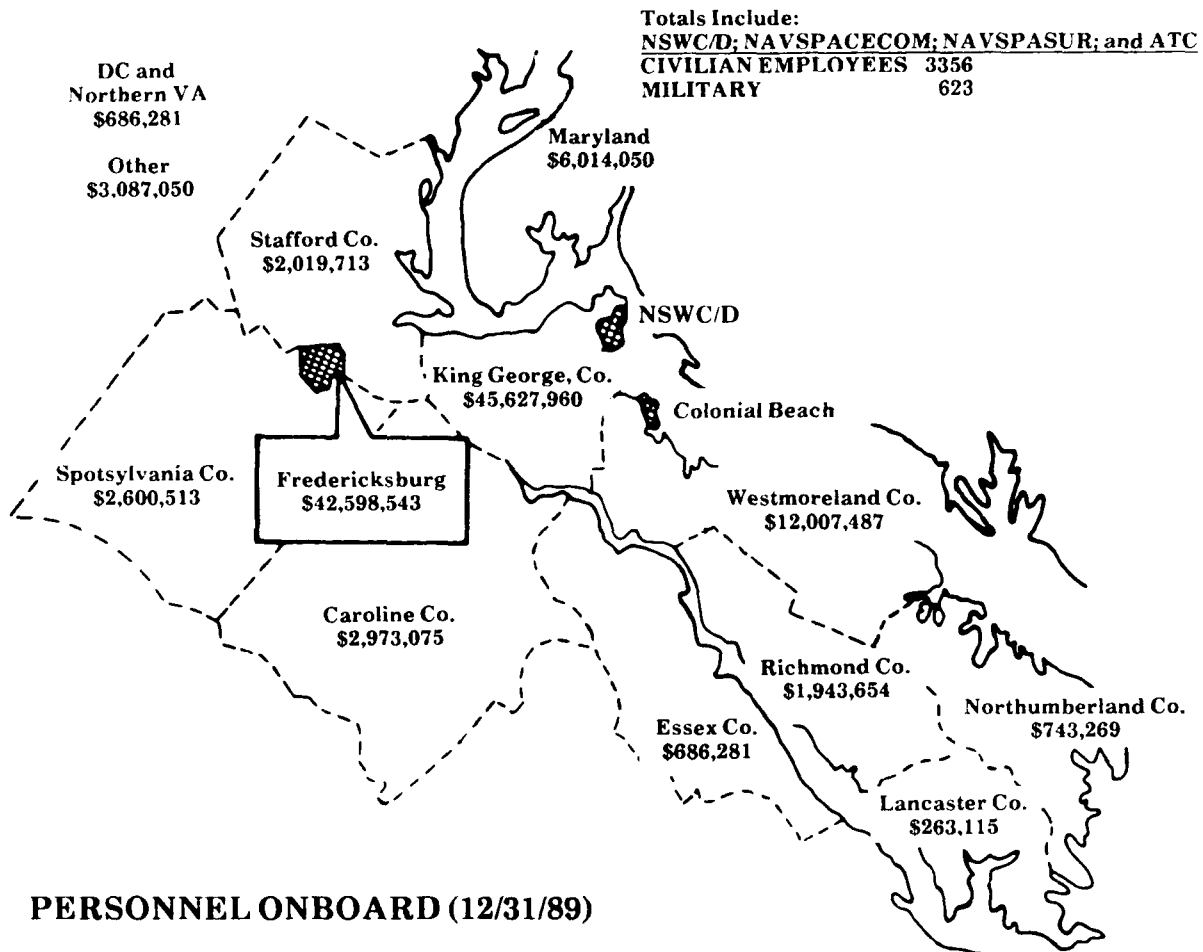
As the Space and Naval Warfare Systems Command's only R&D center with a surface ship warfare mission, NSWC brings experience, dedication, and a tradition of excellence to its work for the surface Navy. In 1987, we changed our name to the Naval Surface Warfare Center to better reflect our role: to not only develop individual weapon systems, but also to integrate them into total combat systems for fleet battle forces.

Dahlgren, the Center's headquarters, has a land area of 4300 acres that includes Potomac shoreline and a 25-mile downriver range for projectile testing. White Oak encompasses 730 acres. The two sites offer unique test facilities; e.g., anechoic chamber, hydroballistics tank, magnetic ships facility, etc. NSWC operates major field activities where field hardware is tested and evaluated under conditions that simulate those encountered at sea: Ft. Lauderdale, Florida; Wallops Island, Virginia; and Ft. Monroe, Virginia.

Under the joint leadership of a military Commander and a civilian Technical Director, NSWC's work draws on many disciplines to help advance the technologies and innovations that will be required for the future. Our 5000 employees (approximately 3000 are home-based at Dahlgren) contribute actively to our Surface Warfare mission.

Even as we work on systems that will go to sea in the next few years, our NSWC team is investigating new concepts that will form the basis for surface warfare systems in the 21st century. A strategic and tactical plan guides our technical and business operations--a plan that gives structure and coherence to our efforts and provides vision and flexibility to take us into the future.

PAYROLL DISTRIBUTION (1/31/90)



PERSONNEL ONBOARD (12/31/89)

Military (117)	Enlisted (85)	Officer (32)
Civilian	FTP	Other*
Scientific and Engineering	2566	40
Other Professional	75	6
Management and Administrative	559	12
S/E Technician	454	9
Technicians	297	7
Clerical	442	30
Other General Schedule	100	38
Ungraded	485	31
Subtotal	4978	173
TOTAL	5095	173

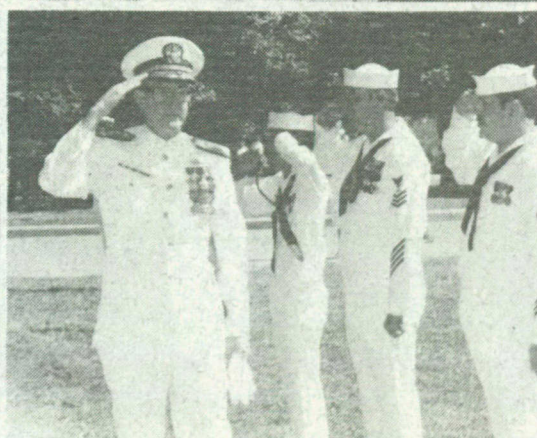
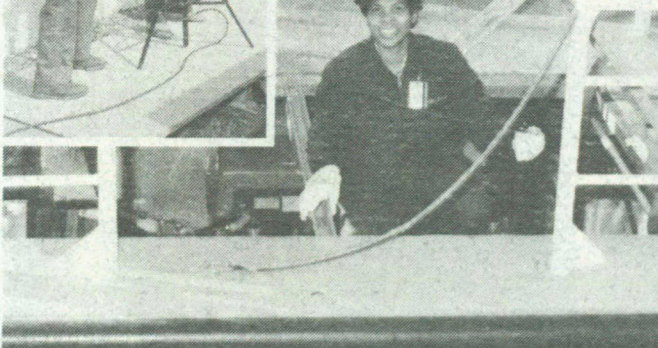
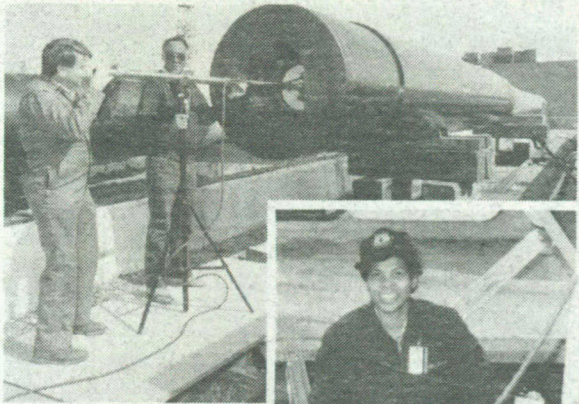
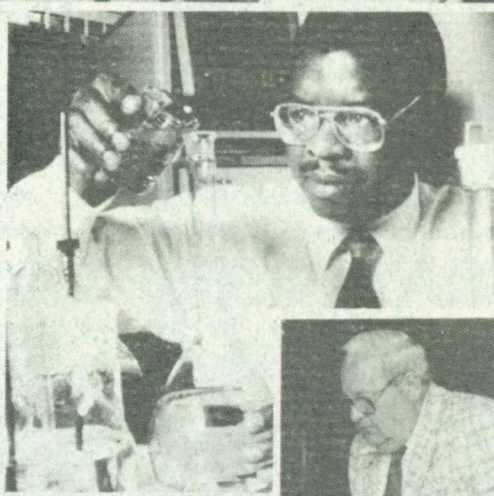
SCIENTISTS AND ENGINEERS BY DISCIPLINE (FTP) (12/31/89)

General Engineering	157
Mechanical & Aerospace Engineering	455
Electrical & Electronics Engineering	679
Chemistry & Chemical Engineering	101
Physics & Physical Science	302
Math and Operation Research Analysis	395
Computer Science/Engineering	377
Other	96
Total	2562

*Other Than Full-Time Permanent (FTP) Employees in Pay Status

PEOPLE—OUR MOST IMPORTANT RESOURCE

NSWC offers its employees a climate for exploration and achievement—an atmosphere conducive to creative challenges. Extensive training opportunities exist. Many employees from this community have enrolled in career development programs. Through personal initiative and financial support from the federal government, they have earned degrees in graduate and undergraduate studies. NSWC's policy is to recognize ability and train its staff for more responsible assignments.



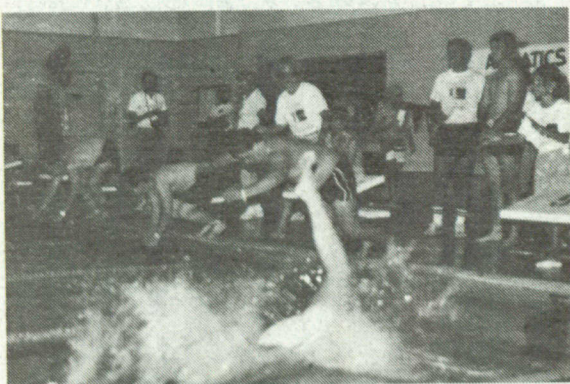
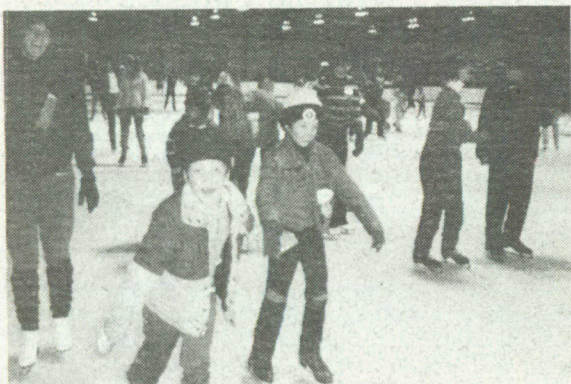
U S NAVY

NSWC IS A LEADER IN COMMUNITY AFFAIRS

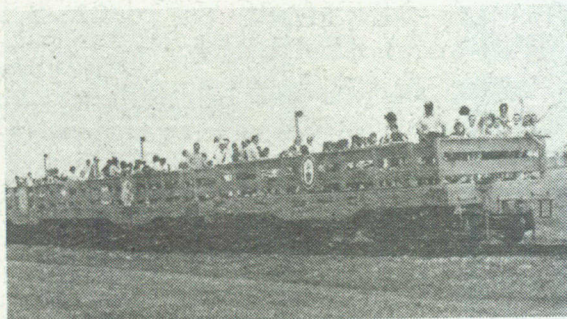
NSWC is a community-minded Center. We open our doors to the residents of the surrounding counties each year for special events and we also participate in community activities outside the Center. Activities not pictured include

King George Schools Sports Activities
King George Litter/Clean-Up Program
Fourth of July Festivities
Contracting Symposium
Scouting Leadership
Combined Federal Campaign

We have all derived benefits from the mutual alliance Dahlgren and the community have to assist each other in fire protection, security, and medical services. Each year, we house bloodmobiles for the American Red Cross and the Navy Blood Program.



Special Olympics activities



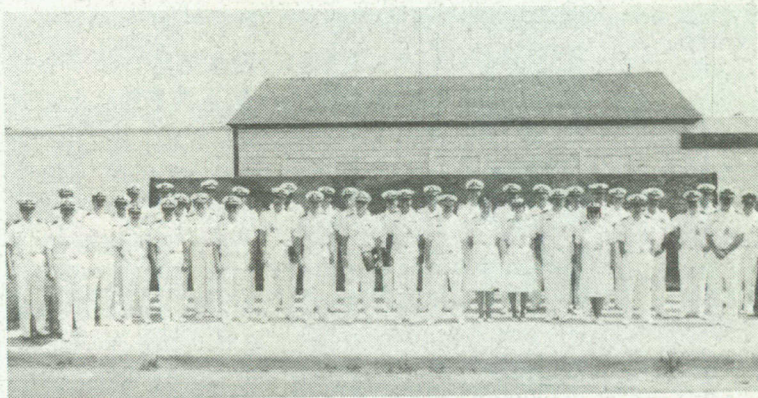
Community folks enjoy a train ride on the Dahlgren Bullet during Open House



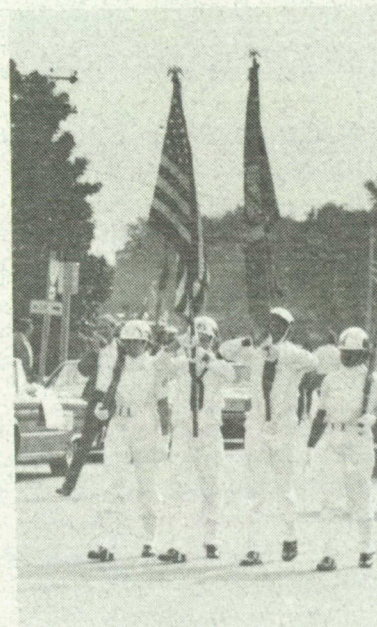
NSWC employees judge local science fairs



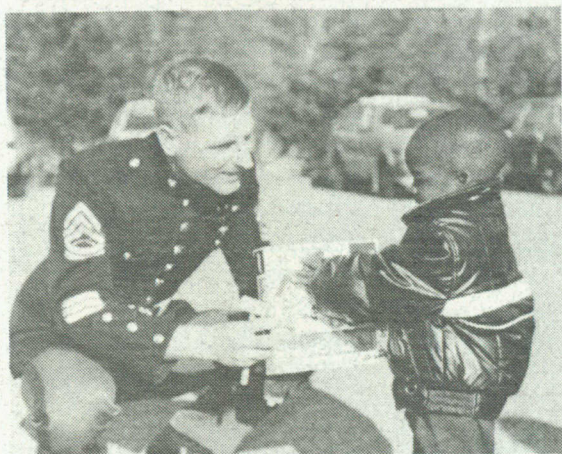
NSWC regularly hosts the King George County Red Cross Bloodmobiles



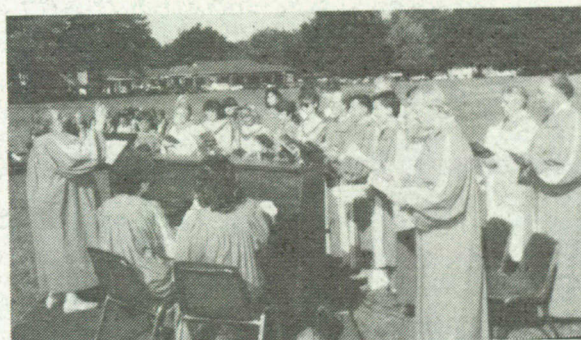
NSWC hosts numerous tours—a group of reservists visiting the Main Range



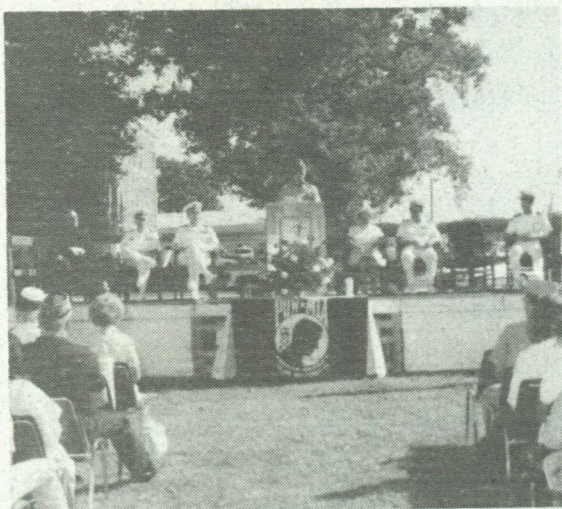
NSWC's Color Guard performs at the King George Fall Festival



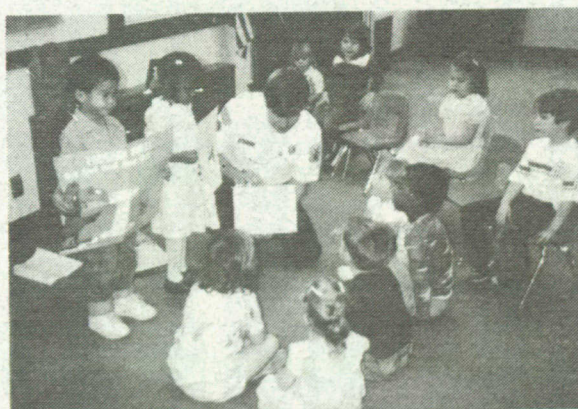
Annual Marine Corps Toys for Tots Giveaway Program



NSWC Chapel Community Choir performs during special event



National POW/MIA Recognition Day is observed to honor all former American prisoners of war—those still missing and their families—who have made extraordinary sacrifices on behalf of the United States



Each year, NSWC's Fire Department takes its safety show to the local schools

CONTRACTS AND PURCHASES (FY89) AT DAHLGREN

Awarded	\$164M
In Virginia	\$122M
In Maryland	\$42M
Total	\$280M

To Small Businesses	\$24M
In Virginia	\$21M
In Maryland	\$3M

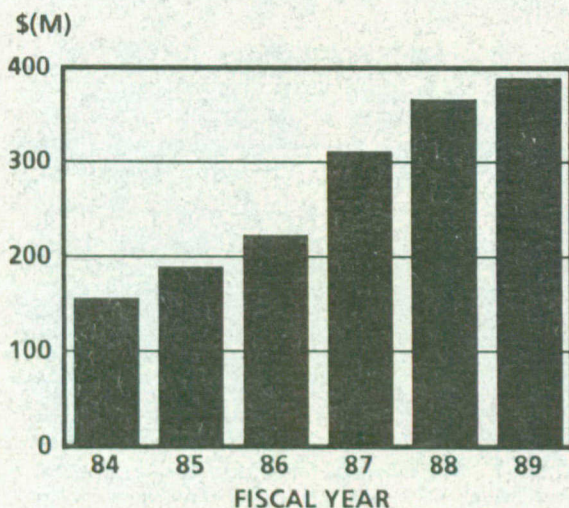
To Disadvantaged Businesses	\$15M
In Virginia	\$13M
In Maryland	\$2M

To Women-Owned Businesses	\$112M
In Virginia	\$112M
In Maryland	\$0M

DISTRIBUTION OF FUNDS FY90 (PROJECTED)

Obligational Authority	\$715M
Contract	\$405M
Labor and Overhead	\$232M
Material	\$54M
Other	\$24M

CONTRACT TRENDS



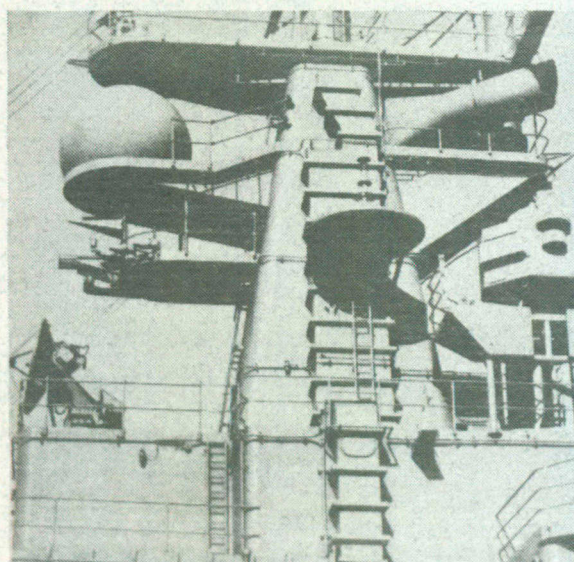
A SAMPLING OF NSWC'S TECHNICAL PROGRAMS AND ACCOMPLISHMENTS

Engineering and Information Systems Department

- Implemented the Centralized Acquisition and Requisition System (CARS), which is an integrated Comptroller and Supply system that processes requisitions in an on-line interactive mode. Accounting transactions for the financial management system are captured as a by-product of the requisition process.
- Improved the quality of publications and photographic services while reducing cost, time, and effort by obtaining a XEROX 6085 System that links writers and illustrators electronically.

Electronics Systems Department

- Designed, developed, and delivered upgraded software packages for the AN/SLQ-32 shipboard ASMD system. Designed and developed portable ELINT and EW analy-



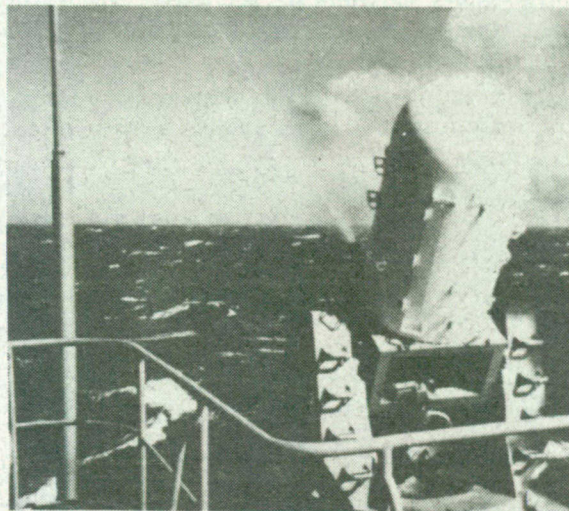
SLQ-32 shipboard installation

sis systems for surface, air, and submarine platforms.

- Supported Fleet contingency operations that included analysis of RF propagation in the Persian Gulf and Eastern Mediterranean to improve AN/SPY-1 performance; analysis of the USS VINCENNES (CG 49) Iranian airbus incident; and analysis of the USS STARKE (FFG 7) incident.
- Designed, developed, and delivered Afloat Intelligence Systems (AN/SYQ-9) to USS SARATOGA (CV 60), USS ABRAHAM LINCOLN (CVN-72), and USS WASP (LHD-1).
- Developed facilities and components and conducted critical tests in uses of pulse power. The cooled pulse forming line and 200-kW average power coupled with a high 10-Hz frequency demonstrated the feasibility to weaponize pulse power as a shipboard terminal defense system.
- Successfully implemented multisensor system integration facility to conduct critical experiments in search and track technologies with fusion/integration of electro-optic, RF, and IR sensors.
- Demonstrated the technical feasibility of closed loop, monopulse, heterodyne laser radar tracking of a target. The ability to accurately track low-flying threats in severe clutter with a laser radar system supports warfighting capabilities in AAW and Point Defense Weapon Systems.

Weapons Systems Department

- Completed qualification of STANDARD Missile Mk 115 Mod 1 Warhead for service use. This Mod provides a replacement explosive for the Mod 0, which used explosive ingredients that are no longer available. This new explosive will be used in the EX 125 Warhead.
- Completed DT III for TOMAHAWK/VLS, which permits deployment of the VLS 581A to the Fleet. This software integration test demonstrated compatibility between VLS and the TOMAHAWK Weapons Control System.
- Delivered Mk 34 AEGIS Gun Weapon System with certified software to Combat Systems Engineering Development Site, Moorestown, NJ for integration and demonstration prior to delivery to DDG 51.
- Completed development of PDR, which is a data reduction program that rapidly analyzes PHALANX internal system data after test or operational use and assesses system performance. PDR was used aboard USS PHILIPPINE SEA to assess PHALANX/SLQ-32 EMI.



PHALANX Close-In Weapon System (CIWS)

- Installed a plotting room evaluation system and trained the crews of USS NEW JERSEY and USS MISSOURI. This system provides realistic plotting room training without shooting the 16-in. guns.
- Completed Preliminary Design Review for the 16-In. Extended-Range Projectile and Battleship 16-In. Gunfire Control System as part of the Battleship Improvement Program.

- Provided technical support for the investigation of the 16-in. gun incident aboard USS IOWA: (1) shipboard gun system and ammunition inspection and analysis and (2) NSWC-based laboratory and gun mount testing of all conceivable initiation modes to replicate the incident.
- Designed, developed, and conducted a series of Joint Live-Fire Tests of the Marine Corp's Light-Armor Vehicle to determine vulnerability and enhancement options.

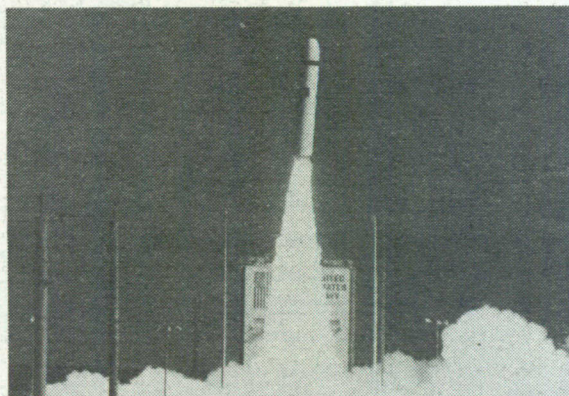
Protection Systems Department

- Demonstrated the feasibility of the Closed-Loop Degaussing concept for Magnetic Silencing of Minesweepers and developed software to simulate the ship's magnetic fields for use in system-tradeoff studies. Initiated negotiations with France, under the Nunn Amendment, to establish a Memorandum of Understanding to develop Closed-Loop Degaussing for Mine Countermeasure Vessels.
- Developed and installed at the Naval Station Pearl Harbor, Hawaii the first new magnetic silencing range to meet all operational performance requirements. Developed and delivered analysis and display software to assist Fleet personnel evaluate this range.
- Measured electromagnetic interference (EMI) of the interaction between SLQ-32 and CIWS aboard USS PHILIPPINE SEA (CG 58) during Trial Bravo. A special EMI Task Force will assess any operational impacts and develop solutions.
- Tested (accepted by the Navy) the first of three EMPRESS II Data Acquisition and Processing System (DAAPS) modules. DAAPS was successfully utilized in the EMP testing of USNS MOHAWK.
- Completed DTII, DTIIB (TECHEVAL),

and OPEVAL for the Chemical Agent Monitor (CAM). The test results are being evaluated; Milestone III is scheduled for January 1990.

Strategic Systems Department

- Completed development and delivered the initial TRIDENT II targeting software.
- Completed development of the Fire Control Software for TRIDENT II. This software, which successfully supported the six initial submarine tests at Cape Canaveral, is capable of supporting initial deployment of TRIDENT II.
- Completed preflight reentry predictions for TRIDENT II D5 Missile X and PEM flights, which included expected CEPs that result from nominal reentry trajectory information vs time and altitude error bounds on some aerodynamic quantities.

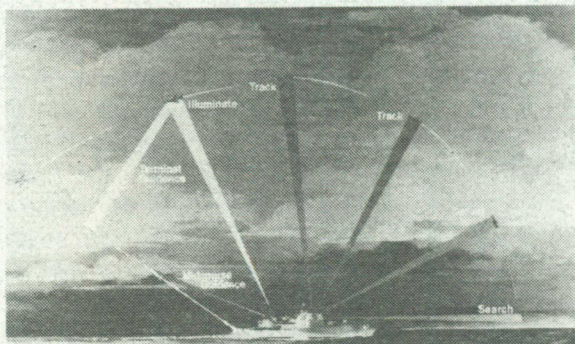


TRIDENT II launch using NSWC's Fire Control Software

- Demonstrated the use of GPS for determining to a high degree of accuracy the deflection of the vertical, astronomic azimuth, attitude of a platform. Deflections of the vertical and astronomic azimuth are important geodetic quantities necessary to precisely align inertial navigation systems where high accuracy is required.

Combat Systems Department

- Delivered to the Fleet the next-generation software for the AEGIS Weapon System. The software addresses improved radar ECM and clutter management performance, auto realignment, enhanced operator controls, improved missile approach angle control for low-E targets, and integrated TOMAHAWK Weapon System. Developed two major PC-based productivity tools to enhance the AEGIS engineering design process and the first color-capable map database for the next-generation AEGIS Large-Screen Display System. Completed system engineering for the first major AEGIS combat system overhaul.



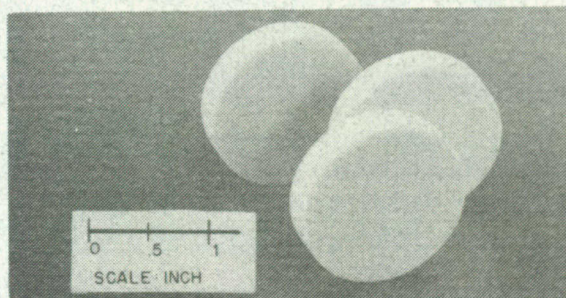
AEGIS engagement sequence

- Demonstrated the American National Standard Institute (ANSI) fiber optics *Distributed Data Interface* Local Area Network, which operates at 100 MHz for AEGIS-type combat systems.
- Conducted concept development source selection for the long-range conventional TOMAHAWK standoff weapon and completed integration and test of the TOMAHAWK Block II Weapon Control System.
- Demonstrated a rule-based expert system for track ambiguity resolution (ESTAR) for application to TOMAHAWK track control.
- Conducted a *Warfare Systems Architecture and Engineering* force assessment that focused on the Navy's ability to meet

mission success criteria in the year 2003 for the Carrier Battle Group.

Research and Technology Department

- Derived a Microscopic Theory of Explosive Structure and Sensitivity that is capable of eliminating the trial-and-error methods used to select new insensitive explosives.
- Developed new missile radome materials (celsian-based ceramics) that can solve two competing problems that typically plague guided missiles at higher speeds: structural toughness and radome transmissivity. At temperatures up to 1400°C (simulating higher speeds), the dielectric constant of celsian remains low and stable, which is critical to the sensors inside the missile. Mechanically, celsian has high resistance to terminal shock, rain erosion, and thermal expansion.



Celsian ceramic test specimen

- Developed a method for processing high-temperature flexible superconducting wire with a current capacity of 700 A/cm.
- Demonstrated a shatter-resistant fragment design with a shatter threshold velocity nearly twice that of a conventional steel fragment. As intercept velocities increase, the ability of a fragment to resist shattering at high velocities will improve its penetration.
- Developed an important analytical tool that is applicable to nonsymmetric as well

as symmetric distributions in areas such as speech analysis, spectral estimation, and image processing. This significant technological breakthrough in signal and data processing extended the classical 1945 Stephen Rice formula.

- Demonstrated a factor of 10 speed improvement over current computer circuit board designs by a novel high-speed parallel computer back plane for application to the next generation of high-speed computers (with significantly improved performance over industry standard buses).
- Formulated a new understanding of the scattering process governing electromagnetic or acoustical energy interaction with dielectric bodies in air or elastic shells in water. This formulation has potential for significant improvements in a sensor's capability to detect and classify targets.

Underwater Systems Department

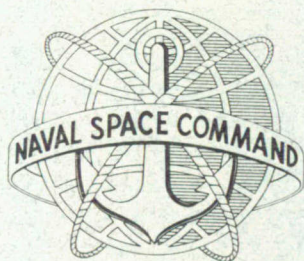
- Developed a functional design baseline for AN/SQQ-89 and integrated and tested the AN/SQQ-89 systems for use onboard the naval combatants CG 57 through DDG 51. Completed two formal software releases of the special test equipment (STE) to provide external test drivers to AN/SQQ-89.

- Employed Mine Mk 60 (CAPTOR) exercise vehicles, which were fully programmed to simulate the full range of operational functions of the CAPTOR mine, in a SHAREM operational exercise. CAPTOR performed well; preliminary analysis indicates that they would have successfully completed the mission being simulated. This was the first use of tactically realistic CAPTOR mines in a Fleet operational exercise.



Mine Mk 60 (CAPTOR)

- Demonstrated the effectiveness of the Torpedo Mk 50 Warhead System EX 122 by a comprehensive series of full-scale tests that simulated a wide variety of targets under static and dynamic conditions. The design has met all environmental, safety, and effectiveness requirements. It passed the Critical Design Review and TECH-EVAL and is scheduled to enter the Fleet in 1991.
- Completed the open-ocean test of RECO.

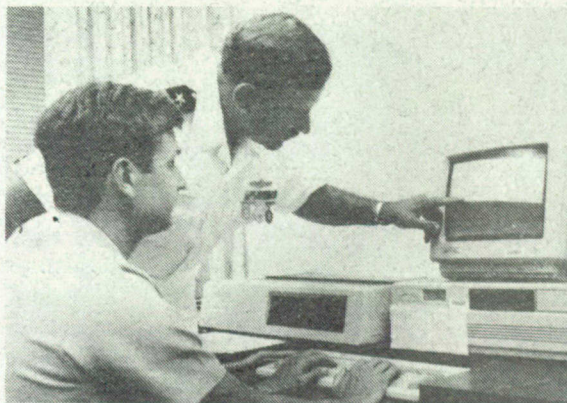


NAVAL SPACE COMMAND (NAVSPACECOM)

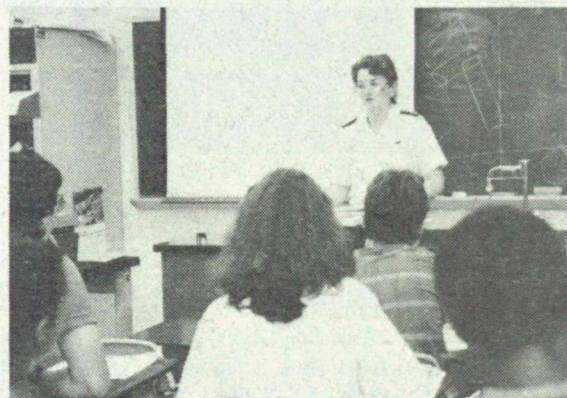
After orbiting the Earth aboard the Space Shuttle *Challenger* in October 1985, astronaut and Marine Colonel James Buchli said that he became acutely aware of the need for our presence in outer space: *As a Marine, I learned the importance of taking the high ground. As an astronaut, I've seen the ultimate high ground of outer space.*

Without a doubt, outer space is quickly becoming a vital *high ground* to both strategic and tactical elements of all our armed forces. And today's Navy, in particular, is growing more dependent on space systems. We use space to communicate, to navigate, and to study the Earth and its oceans; and we look into space to keep track of unfriendly objects that float through it.

Our growing dependence on space prompted the Secretary of the Navy to establish a new command that would consolidate our space efforts. The Naval Space Command (NAVSPACECOM) was commissioned at Dahlgren in 1983. It was a decisive move to bring together several activities under a single command that could more effectively guide our future operational uses of space.



CDR Robert King (standing) and LT Joseph Spry check an orbit prediction program that can be run on shipboard PCs; it displays overhead orbits for navigation satellites in the NAVSTAR Global Positioning System



LT Cheryl Spohnholtz reviews space-related opportunities in the Navy with students enrolled in a space systems engineering course during last summer's Virginia Governor's School for Gifted Students that was held in Fredericksburg



**RADM DAVID E. FROST, USN
COMMANDER
NAVSPACECOM**

RADM David E. Frost is a native of Long Prairie, Minnesota. He graduated from the U.S. Naval Academy with a Bachelor of Naval Science degree and was commissioned in the Navy as an Ensign in June 1963.

His first assignment was aboard USS WALKE (DD 723) where he served for over two years as Electronics Maintenance Officer and Combat Information Center Officer. He reported to flight training in March 1966 and was designated a Naval Aviator in June 1967. After training in the F-4, he was assigned to fighter squadron 151 (VS-151) where he made two deployments to Southeast Asia aboard USS CORAL SEA (CV 43).

He next reported to VF-121, the F-4 training squadron, as Tactics Phase Leader and as a TOPGUN instructor. When TOPGUN became

an independent command in November 1971, he detached from VF-121 and served as a TOPGUN instructor, the first Executive Officer, and as interim Commanding Officer of Navy Fighter Weapons School until he transferred to VF-154 in September 1972. He made two deployments in VF-154 and was subsequently assigned to the Bureau of Naval Personnel, where he served as Fighter Placement Officer. Upon completion of this tour, he transitioned to the F-14 and reported to VF-114 in May 1977 for duties as the Executive Officer. He assumed command of the squadron in June 1978 and served in that capacity until March 1980.

His next assignment was Commanding Officer of fighter squadron 101, the F-14 training squadron at NAS Oceana. In February 1982, he was transferred to the OPNAV Staff where he served as the F-14 Program Coordinator and later as Executive Assistant to the Deputy Chief of Naval Operations for Air Warfare (OP-05). Upon detaching from OP-05 and completing the required training, he assumed command of USS SEATTLE (AOE 3) in August 1984. He served as Commanding Officer until June 1986 and, during that time, the ship was awarded the Battle *E* and a Navy Unit Commendation.

In August 1986, he took command of USS SARATOGA (CV 60) and served as Captain until March 1988. During that time, USS SARATOGA won two consecutive Battle *Es*. He reported as Commander, NAVSPACECOM at Dahlgren, Virginia in March 1988.

During his aviation career, RADM Frost has accumulated more than 3200 flight hours and 800 carrier landings. His awards include the Legion of Merit, four Meritorious Service Medals, 14 Air Medals, four Navy Commendation Medals with Combat V, and the Vietnamese Cross of Gallantry.

RADM Frost is married to the former Marjorie Raby of Oswego, New York. They have three sons, Matthew, Adam, and David.



COL CHARLES R. GEIGER, USMC
DEPUTY COMMANDER
NAVSACECOM

The son of COL and Mrs. A. B. Geiger, USMC, COL Geiger graduated from Camp Lejeune High School with his wife-to-be, Carole, in June 1960. He attended Georgia Tech for two years before enlisting in the Marine Corps in February 1962.

After Boot Camp at Parris Island, South Carolina and an initial assignment to what was then A School at NAS Jacksonville, Florida, he reported to Pensacola, Florida for flight training as a Marine Aviation Cadet (MARCAD). He earned his wings in February 1964, was married, and embarked on a long and continuous career in Fighter Aviation.

Upon completion of his second combat tour, COL Geiger spent two years on exchange duty with the Royal Air Force in Scotland. He returned to the United States to attend Amphibious Warfare School in January 1972 and then

returned to college on the Bootstrap Program where he earned a bachelor's degree in aviation management at Auburn University.

COL Geiger returned to WESTPAC a third time as the Maintenance Officer of a Fighter Squadron. He then attended the Air Command and Staff College and, at the same time, completed work on a master's degree in business administration at Auburn University. Subsequently, he resumed flying as the XO, and ultimately the CO, of his own Fighter Squadron. While CO, he completed his fourth tour in WESTPAC.

In the summer of 1980, COL Geiger reported to HQMC to serve as the first head of the Aviation Safety and NATOPS Branch. He went on to attend the Naval War College where he graduated with distinction. Back in Washington, D.C., he served two years with the Office of the Secretary of Defense, working in Tactical Aviation for Program Analysis and Evaluation.

He returned to WESTPAC for a fifth time as the Commanding Officer of a Marine Fighter Group. Following that tour, he served for two years as the Force Marine for the Commander Naval Air Forces, Atlantic Fleet before reporting to Dahlgren as Deputy Commander for Naval Space Command in July 1989.

COL Geiger's decorations include two Legions of Merit, Distinguished Flying Cross, Bronze Star w/combat V, Defense Meritorious Serve Medal, Meritorious Service Medal, Air Medal with numeral 22, and the Combat Action Ribbon. He has over 2000 hours in the F-4 Phantom and more than 350 combat missions. His most recent flying is in the F/A-18 Hornet and several types of helicopters.

COL Geiger and his wife, Carole, have two sons: Corey is an electrical engineer and Cameron is a second lieutenant in the Marine Corps.



DR. WILLIAM E. HOWARD III
TECHNICAL DIRECTOR
NAVSPACECOM

Dr. William E. Howard III was named Technical Director for the Naval Space Command in January 1985. Born in Washington, D.C. on August 25, 1932, Dr. Howard graduated from Rensselaer Polytechnic Institute with a B.S. degree in physics in 1954. He also holds a master's degree (1956) and a Ph.D. degree (1958) in astronomy from Harvard University.

As a Research Associate and Assistant and Associate Professor of Astronomy at the University of Michigan from 1959 to 1964, Dr. Howard engaged in research in radio astronomy, taught graduate and undergraduate courses, advised honors students, and participated in other academic committee activities.

Between 1964 and 1977 at the National Radio Astronomy Observatory in Charlottesville, Virginia and Green Bank, West Virginia,

Dr. Howard conducted scientific research and helped manage the observatory as it was developing into a major national center for radio astronomical research.

Dr. Howard served as Director of the National Science Foundation's Division of Astronomical Sciences from 1977 to 1982 and was responsible for the funding of university research in ground-based astronomy and the operations of five major national astronomical research centers.

In 1982, Dr. Howard worked with the Office of Technology Assessment, Congress of the United States, where he undertook a study of the issues and problems connected with the nation's space research program.

Before joining the Naval Space Command in 1985, Dr. Howard served with the Central Intelligence Agency as the Senior Intelligence Analyst for the Space Systems Division, working on current and future foreign satellite system missions and capabilities, long-range planning for space intelligence, and space-related assessments.

At the Naval Space Command, Dr. Howard has undertaken programs to build a small satellite to detect radio frequency interference from space and to build an instrument to permit naval and NASA astronauts to geolocate objects on the Earth from space; he has been a major spokesman for the increased use of small satellites for military purposes.

Dr. Howard is a member of the International Astronomical Union; the American Astronomical Society for which he served as Treasurer and a member of the Executive Committee in 1975-77; the International Scientific Radio Union; the Astronomical Society of the Pacific; and Sigma Xi. He has authored many publications for professional and technical journals on planetary and galactic astronomy.

Dr. Howard is married to the former Miriam R. Sitler. They have two children, Bill and Jennifer.

NAVSACECOM TODAY

From our headquarters aboard NSWC, we carry out our mission to provide space systems support directly to the U.S. Fleet and Fleet Marine Forces. Our new Naval Space Operations Center gives us a first-of-its-kind centralized control facility where our personnel can efficiently manage Navy satellite systems.

We currently manage the TRANSIT navigation satellite system. Fully operational since 1968, TRANSIT was initially conceived to help our Fleet Ballistic Missile submarines track their positions more accurately. The Navy Astronautics Group, one of our subordinate commands headquartered in California, operates the TRANSIT system. Today, TRANSIT is used for navigation by virtually all U.S. Navy and U.S. flag ships as well as foreign commercial and military vessels the world over.

We manage a number of surveillance programs as well. The tracking of space objects is conducted by another of our subordinate commands, the Naval Space Surveillance Center (NAVSPASUR), headquartered at Dahlgren. We also manage the Navy's new Over-the-Horizon Radar (ROTHR) systems. ROTHR is a ground-based system that provides over-the-horizon air and surface radar coverage that is capable of detecting ships and aircraft out to ranges in excess of 1000 nautical miles. This system, which is now entering deployment, will be operated by another of our subordinate activities, the Fleet Surveillance Support Command, headquartered near Norfolk, Virginia. Detachments of the Command will deploy with operational ROTHR systems in strategic locations around the globe.

When the U.S. Space Command was established in September 1985, we took on a significant additional role as the naval component in that unified command. In this position, we support efforts by the unified commander-in-chief to pull together the capabilities and resources of the separate armed services.

MANPOWER (DAHLGREN AREA)

	FY88	FY89	FY90
Headquarters			
Military	44	44	44
Civilian	53	53	53
NAVSPASUR			
Military	78	82	116
Civilian	145	141	152

O&MN FUNDING (\$M AS OF 1990)

	FY89 Actual	FY90 Budget*	FY91 Budget*
Headquarters	6.1	5.0	5.1
NAVSPASUR	15.2	16.6	17.5
Navy Astronautics			
Group	9.8	7.4	6.4
Fleet Operations			
Support	23.5	28.0	34.7
Telecommunications,			
Command, and			
Control	7.5	7.2	60.1
Total O&MN	62.1	64.2	123.8

*President's Budget

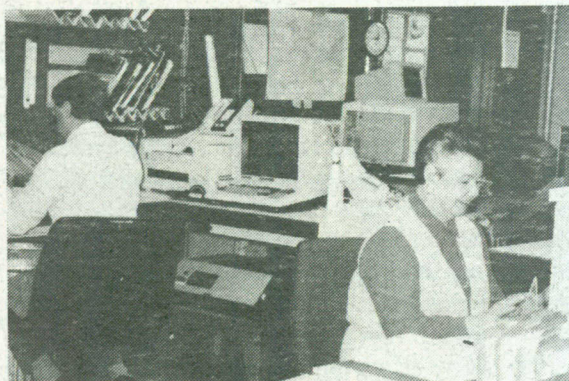
BREAKDOWN OF O&MN COSTS (\$M AS OF 1990)

	FY89 Actual	FY90 Budget	FY91 Budget
Headquarters	2.0	2.1	2.2
Civilian Personnel	0.5	0.5	0.5
Facilities Operations			
and Maintenance	3.6	2.4	2.4
Other Purchases	6.1	5.0	5.1



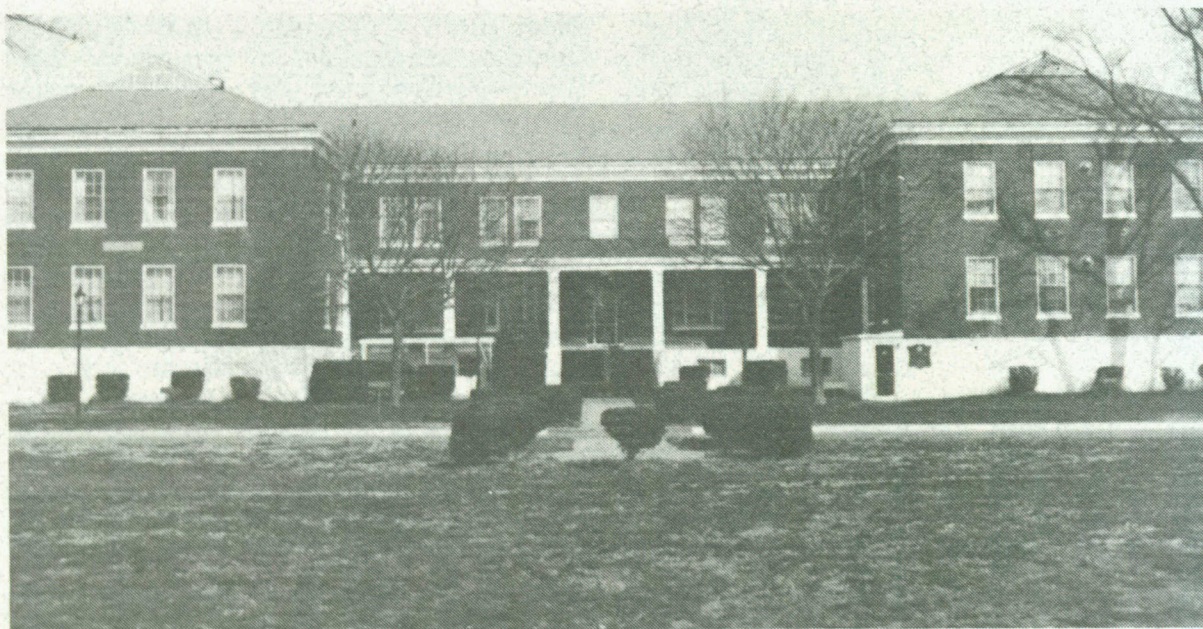
NAVAL SPACE SURVEILLANCE CENTER (NAVSPASUR)

The Naval Space Surveillance Center (NAVSPASUR) was established 1 February 1961. Since that time, NAVSPASUR has developed into a space surveillance radar system with multiple transmitters and receivers that span the United States. NAVSPASUR also receives information from 25 U.S. space sensors worldwide that assist in maintaining a dynamic catalog of over 7000 space objects and their orbits.



NAVSPASUR Operations Center

As NAVSPASUR grew, so did our missions. A message center that processes over 700,000 messages annually is now part of the Center. NAVSPASUR functions as the Alternate Space Surveillance Center (ASSC) and operates the Tactical Event Reporting System. Our newest mission is to perform the duties of the Alternate Space Defense Operations Center (ASPADOC).



NAVSPASUR Building



CAPT HORATIO W. TURNER IV, USN
COMMANDING OFFICER
NAVSPASUR

CAPT Turner entered the Navy through the NROTC program at Princeton University. He was commissioned upon graduation in June 1967. He completed flight training and was designated a Naval Aviator in August 1968.

CAPT Turner began his aviation career flying the SH-3 Sea King helicopter in HS-4 and HS-8, with two WESTPAC deployments. Next came shore duty in HS-10, with temporary assignment to HS-8 for a 1972 WESTPAC deployment, followed by temporary assignment to COMFAIRWESTPAC for 10 months to establish a Naval Air Facility at Misawa, Japan.

In 1974, CAPT Turner transitioned to the SH-2 Sea Sprite helicopter. He assisted in the establishment of HSL-37 at Barbers Point, Hawaii, first as squadron Operations Officer and then as Officer-in-Charge, HSL-37 Detach-

ment ONE, deploying to WESTPAC and the Indian Ocean in 1976. He then served Commander, Naval Surface Group Mid-Pacific as Air and ASW Officer.

In 1977, CAPT Turner attended the Naval War College Command and General Staff course; he graduated with highest distinction. He was next assigned to HSL-34, NAS Norfolk, Virginia as Safety Officer and Maintenance Officer.

In August 1981, CAPT Turner reported to the Deputy Chief of Naval Operations for Plans, Policy, and Operations (OP-06) in Washington, D.C., where he served as Air Warfare Officer and as primary action officer for Communications, Electronic Warfare, Outer Space, Arctic Warfare, and JCS and Navy wargaming.

CAPT Turner reported for duty as Executive Officer, helicopter Training Squadron EIGHT in January 1984 and, in March 1985, assumed the duties of squadron Commanding Officer. During his tour as Commanding Officer, HT-8 won the CNO Safety Award and the Chief of Naval Air Training Award for training efficiency.

CAPT Turner was next assigned as Executive Assistant to the Director of Operations, U.S. Space Command, in July 1986. In March 1988, he was assigned as Deputy Director of Plans for Space Systems, where he directed USSPACECOM planning for new system requirements and current system upgrades.

During his aviation career, CAPT Turner has accumulated more than 3500 flight hours. His awards include the Defense Superior Service Medal, the Meritorious Service Medal, and the Navy Commendation Medal (two awards). He holds subspecialties in Space Operations, Political Military Affairs, and Antisubmarine Warfare and is a proven joint specialist.

CAPT Turner is married to the former Penelope McCord Watson of San Antonio, Texas. The Turners and their children, Alexandra and Ridge, reside in Dahlgren, Virginia.



DR. STEPHEN H. KNOWLES
TECHNICAL DIRECTOR
NAVSPASUR

Dr. Stephen H. Knowles, a native of New York City, graduated from Amherst College cum laude in 1961. After graduation, he began his government career at the Naval Research Laboratory (NRL). Dr. Knowles studied for his doctorate while employed at NRL and received his Ph.D. in astronomy from Yale University in 1968 with a specialization in celestial mechanics.

His career includes 25 years spent at NRL in the Space Science Division, where his research included investigations in the fields of radar astronomy, radio astronomy, and signal processing. He devoted two years (1974 to 1976) to related research in Sydney, Australia.

Dr. Knowles reported to NAVSPASUR in September 1986. He resides in Woodbridge, Virginia.

NAVSPASUR TODAY

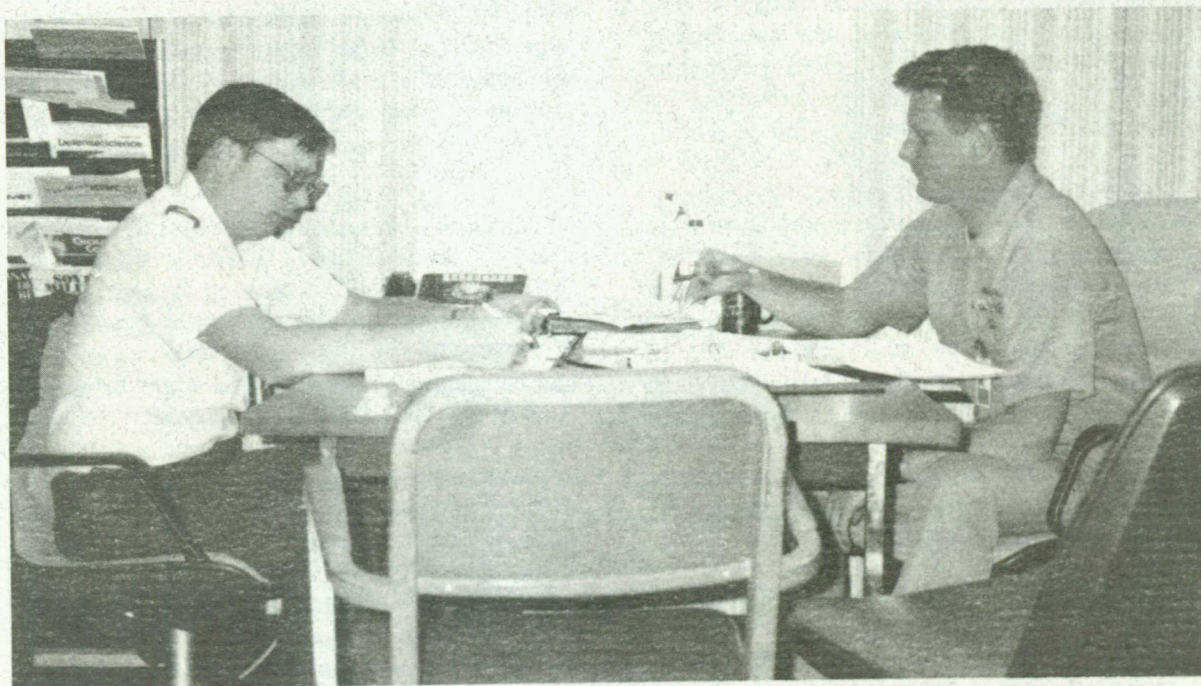
NAVSPASUR is an Echelon 3 command under Commander, Naval Space Command (COMNAVSPACECOM). NAVSPASUR provides space systems information support to the maritime forces of the U.S. and its allies. A variety of data products are provided to the Fleet and to shore commands to counter space threats and to better utilize space-associated tactical information.

NAVSPASUR reports to the Commander-in-Chief, U.S. Space Command via COMNAVSPACECOM. Acting as a sensor for the Space Surveillance Network (SSN), NAVSPASUR provides satellite observations, orbital elements, and look-angles to the U.S. Space Command Space Surveillance Center located in Cheyenne Mountain, Colorado Springs, Colorado. Since December 1984, NAVSPASUR has functioned as the Alternate Space Surveillance Center (ASSC), exercising back-up command and control of the SSN. This requires the receipt, processing, analysis, and distribution of data from the SSN.

In 1983, all General Service (GENSER) Telecommunications were placed under NAVSPASUR control, due to the high percentage of message traffic addressed to NAVSPASUR. In addition, the communications center now processes all messages for NSWC, ATC, and all surrounding commands in the Dahlgren area.

COMNAVSPACECOM was assigned operational control of the Tactical Event Reporting System in October 1985 and the day-to-day administration and operations were delegated to NAVSPASUR. NAVSPASUR then established communications and processing capabilities and was operational in that capacity by June 1986.

On 21 November 1986, USCINCSpace designated NAVSPASUR the Alternate Space Defense Operations Center (ASPADOC), with the mission to monitor all space events and to inform all U.S. system operators of potential impacts to their satellite systems.



NAVSPASUR personnel review operations

A CLOSER LOOK

Resources and Administration Services Department—This department is responsible for the administrative and financial support of NAVSPASUR and its remote detachments. The Administration Services Division assures compliance with command security programs, provides management analysis services, directs all phases of civilian and military personnel management programs, and directs the Manpower Management Program.

Engineering Department—This department is responsible for the operational readiness, maintenance, and functioning of the equipment assigned to the field stations and sensor system. It supervises the sensor field stations and is responsible for their technical effectiveness, conducts tests on new or prototype systems, provides technical assistance in analysis studies, and directs the contractor that operates the nine field stations. The department also performs all necessary engineering for the development and integration of new equipment into the field. Engineering oversees the Command property accounting function and Field Station Facilities Management. Recently, it assumed responsibility for the Center MILCON programs and facilities.

Automatic Data Processing Department—This department operates and is responsible for error detection on the CDC CYBER computer systems, two Automatic Digital Data Assembly Systems (ADDAS), and the Space Information Management System (SIMS). It controls and maintains the data flow lines to and from the field stations, establishes operator procedures, and ensures the training of operators. The computer system is operated 24 hours, seven days a week to support operational requirements.

Operations Department—The Operations Center is manned 24 hours by a qualified Space Surveillance Watch Officer, a Command Duty Officer, and a watch team. Operations

Center personnel continually monitor a catalog of 6600 space objects and process all launches, maneuvers, breakups, and deorbits of foreign and domestic satellites. It is responsible for training personnel to ensure sufficient manpower to assume the ASSC and the ASPADOC functions normally conducted by the Cheyenne Mountain complex, Colorado Springs, Colorado.

Analysts in the department maintain an up-to-date catalog of all space objects. They keep an accurate database on all foreign launches, which enables them to predict future satellite positions and impact points for decaying satellites. The Intelligence Division maintains all incoming intelligence data, briefs personnel on a need-to-know basis, and establishes liaisons with other intelligence agencies.

Communications Department—NAVSPASUR's Telecommunications Center transmits and receives messages for the entire Dahlgren base, including the AEGIS Training Center (ATC), Naval Space Command (NAVSPACECOM), NSWC, and other tenant activities. It provides GENSER communications that utilize the Automatic Digital network (AUTODIN), which is DoD's worldwide message system. The Communications Center operates and maintains an additional 15 circuits in direct support of the NAVSPASUR mission. It is manned 24 hours a day, seven days a week.

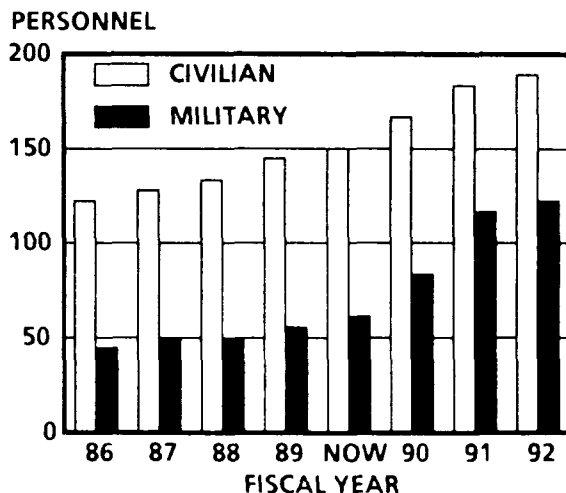
Systems, Plans, and Projects Department—This department is constantly working to keep NAVSPASUR moving forward. They look to the future—develop new systems to allow the Center to progress with the needs of the increasing missions and responsibilities of NAVSPASUR. Researching cost, site locations, necessary manpower and equipment, support from other commands and agencies, and future needs are only a few of the many facets of this department. It is currently working on preparing the Center to move to their new building (expected move is FY93), upgrading to a new computer system, installing sensor upgrades, and improving connectivity with the SSN.

Analysis and Software Department— This department provides the mathematics and physics support required to determine satellite orbits and to compute the numerous orbital data products required by Naval and other DoD forces. It develops and maintains software for all operational NAVSPASUR computers. The Systems Division installs and maintains computer operating systems and develops and maintains communications software. The Applications Division develops and maintains the software required to satisfy NAVSPASUR's basic missions (i.e., Space Surveillance, Fleet Support, ASSC, and ASPA-DOC). The Special Projects Division provides mathematical modeling of satellite-related applications and supports the other divisions in projects that require extensive developmental efforts.

MANPOWER/BUDGET

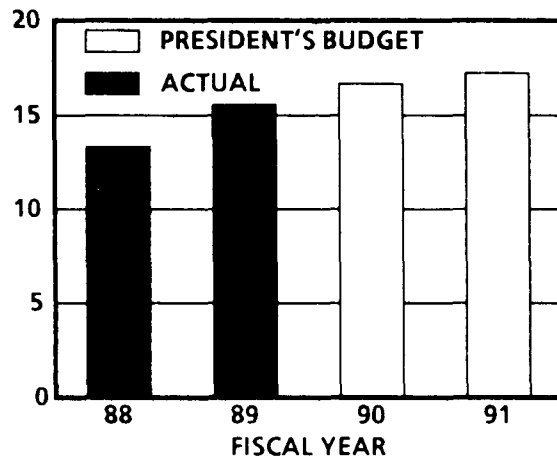
NAVSPASUR's personnel and budget have continually grown commensurate with the command's increased responsibilities. Present manpower at NAVSPASUR consists of 154 civilians (57 scientists and engineers, 34 technicians, 47 managers/administrators, 8 clerical personnel, and 8 secretaries). There are 21 officers and 42 enlisted military personnel.

PROJECTED MANPOWER



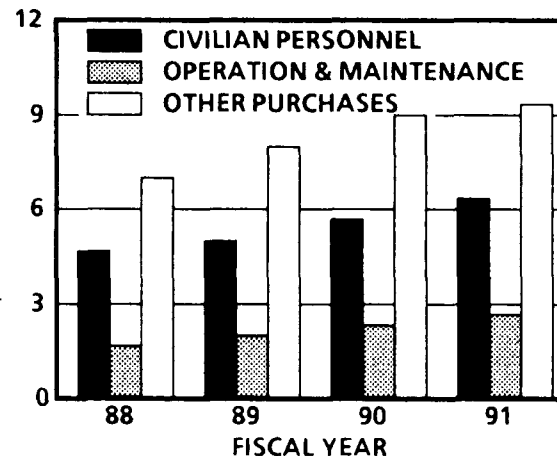
O&MN FUNDING

MILLIONS



BREAKDOWN OF O&MN COSTS

MILLIONS





AEGIS TRAINING CENTER (ATC)

The mission of ATC is to train Naval personnel in the maintenance and operation of the highly sophisticated AEGIS Combat System. ATC, which is a tenant command of NSWC at Dahlgren, was commissioned in November 1985. It includes subordinate training units at Moorestown, New Jersey; Wallops Island on the eastern shore of Virginia; Norfolk, Virginia; and San Diego, California.



AEGIS Training Center (ATC)



CAPT SHELDON L. MARGOLIS, USN
COMMANDING OFFICER
ATC

CAPT Sheldon L. Margolis, Commanding Officer of ATC, is originally from Baltimore, Maryland. He assumed command on 27 January 1987 after serving at the Naval Sea Systems Command, Washington, D.C.

After graduation from Rensselaer Polytechnic Institute under the Naval Reserve Officer Training Corps program, he served in several ships and technical shore assignments. He received his master's degree in Electrical Engineering from the Naval Postgraduate School, Monterey, California. CAPT Margolis had command of USS LYNDE MCCORMACK (DDG 8) from August 1983 through 1986.

CAPT Margolis holds the Bronze Star with Combat V, the Purple Heart, the Meritorious Service Medal, the Navy Commendation Medal, the Combat Action Ribbon, and various campaign and service medals.

He is married to the former Elizabeth Koeber of Pitman, New Jersey. They have two children, Samantha Dyan and Scott Harrison.



MR. LUKE H. MILLER
TECHNICAL DIRECTOR
ATC

Mr. Miller was born in San Angelo, Texas. He graduated from The University of Texas at Austin, earning a B.S. degree and a commission in the U.S. Navy. He later received an M.S. degree in Computer Science from the Naval Postgraduate School.

He served in a variety of afloat billets during his naval career and was designated a Proven Subspecialist in Command, Control, and Communications. Mr. Miller was the U.S. representative to NATO for Navy Tactical Data System (NTDS) data extraction/data reduction and Program Manager for the NTDS Model 4 system development effort. Later, he became Project Officer for Restructured NTDS. He then directed operation of the nation's largest space surveillance radar system and was awarded the Navy Meritorious Service Medal.

After completing his naval career, Mr. Miller joined private industry. He authored a document for CNO (OP-943) that identified near-term and out-year requirements for space surveillance system capability. He was a Project Engineer in the Ocean Surveillance Information System Baseline Upgrade (OBU) program and later became the OBU support services Project Manager to the Naval Space and Warfare Systems Command. Mr. Miller furnished engineering services to NSWC and the AEGIS Training Center, supporting the planning and engineering of the Combat Systems Laboratory, AEGIS Combat Systems Center, and AEGIS Education Center.

Mr. Miller was selected as Technical Director, ATC, in 1987. He and his wife, Cindy, make their home in King George.

ATC TODAY

We currently have over 170 active duty Navy instructors, staff, and support personnel and average about 120 Navy students. Both of these numbers are steadily increasing. We also employ 34 civil service and many civilian contract personnel. By the end of the year, the naval instructional staff is expected to reach 230 and the average daily student population will be about 120. We expect that in 1990 alone, some 377 students will pass through our school.

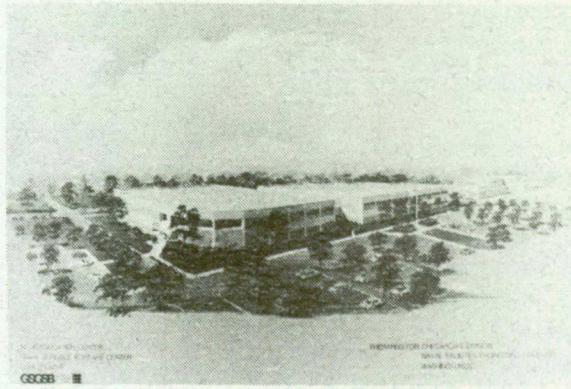
Our existing facilities will soon more than double in size. Ground-breaking on our new multimillion dollar, 78,000-square-foot building was conducted in February 1989 and the building will be ready to support training in January 1991.

The AEGIS Combat System represents the Navy's state of the art—radars and other sensors, computers, displays, weapons, and, above all, people woven to support a ship's mission and that of the Navy and the nation. After completing intensive and lengthy hands-on training, each student becomes a vital part of his ship's Combat System Team.

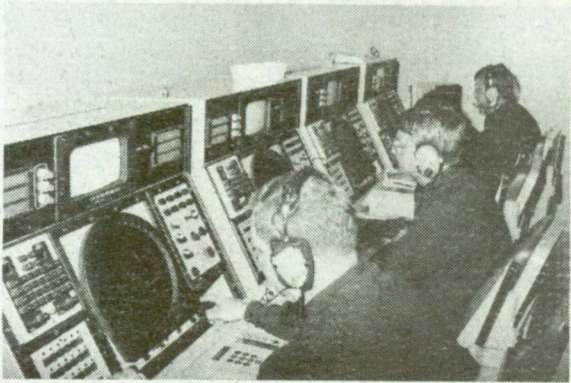
Students are here from four to 27 weeks, depending on their specific instructional requirements. Most long-term students have already had a year of intense naval technical schooling before they arrive; they represent the cream-of-the-crop in terms of intelligence and motivation.

At week's end, these students often seek off-base recreation in the area or in nearby communities. About one-third of them are married and bring their families with them; therefore, they need short-term rental housing. Another third are also married but for a variety of reasons (e.g., children in school) choose to leave their families elsewhere.

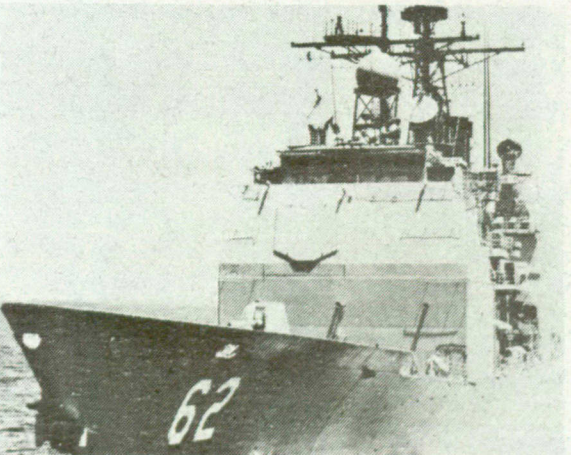
The instructional staff members are typically senior enlisted personnel or junior officers who serve a three-year tour-of-duty at ATC. They generally become more involved in the activities of the community (e.g., athletic coaches, volunteer firemen, etc.).



Artist's conception of ATC building expansion



Students in laboratory at ATC



USS CHANCELLORSVILLE (CG 62)

ATC BUILDING EXPANSION

DDG/Baseline 4 Training

- 78,000-Square-Foot Building
- 22 12-Man Classrooms
- Two 24-Man Classrooms
- Seven Laboratories
- One Multipurpose Lecture Hall
- AN/SPY-1B Radar System
- Library
- Offices and Support Facilities
- Projected Cost \$9M
- Start Construction--February 1989
- Ready for Training--January 1991

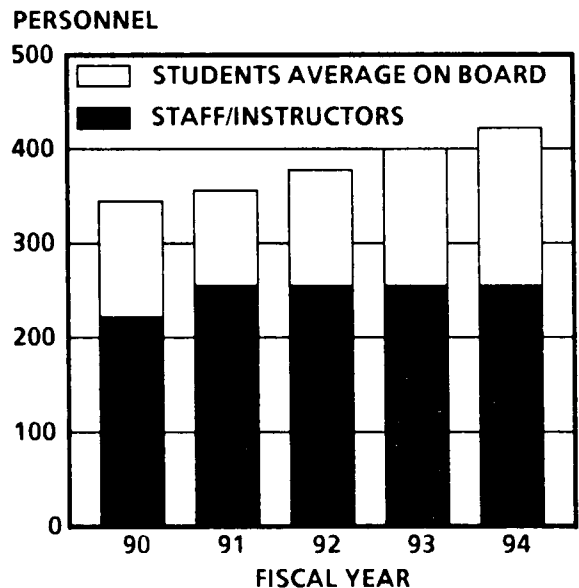
FINANCIAL IMPACT (\$M)

	FY90	FY91	FY92
Staff	2.5	2.6	2.8
Civil Service	1.3	1.6	1.7
Students	3.4	3.7	4.0
Contracts	4.9	3.5	5.0
MILCON	8.0	8.2	0.0
Activation	11.0	7.0	4.0
Total	31.1	26.3	17.5

WHERE WE LIVE

	Personnel	Dependents
Dahlgren/ King George	252	314
On Base	191	192
Off Base	61	122
Fredericksburg/ Spotsylvania/ Stafford	20	32
Colonial Beach	26	50
Southern Maryland	7	8
Other	16	29
Total	321	433

AEGIS EDUCATION CENTER MANPOWER (STAFF / STUDENTS)



USS ARLEIGH BURKE (DDG 51)

USS ARLEIGH BURKE was named for ADM Arleigh A. *Thirty-One Knot* Burke, USN (Ret), who commanded Destroyer Squadron 23 during World War II. It was launched on 16 September 1989 and is the first of 29 AEGIS Guided Missile Destroyers requested by the U.S. Navy (13 have been contracted). The ship is fitted with the AEGIS Combat System and is designed to provide Anti-air Warfare (AAW), Antisurface Warfare (ASUW), and Antisubmarine Warfare (ASW) support utilizing an array of the latest computer-guided sensory and attack systems.

ATC is responsible for the training of the highly specialized technicians and operators needed to maintain and operate the AEGIS Combat System. The new destroyer is scheduled for completion in January 1991 and commissioning in February 1991. It will have a complement of 26 officers and 315 enlisted men.